DOCUMENT RESUME

ED 209 516 CE 030 561

AUTHOR Poehls, Eddie; And Others
TITLE Graphic Arts (Graphic Communications). Industrial Arts, Senior High--Level II. North Dakota Senior High Industrial Arts Curriculum Guides.
INSTITUTION North Dakota Univ., Grand Forks. Dept. of Industrial Technology.
SPONS AGENCY North Dakota State Board for Vocational Education, Bismarck. Research Coordinating Unit.; Office of Education (DHEW), Washington, D.C.
PUB DATE 81
NOTE 68p.; For related documents see CE 030 555-566 and ED 173 662.

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Behavioral Objectives; Careers; Course Descriptions; Course Objectives; Curriculum Guides; *Graphic Arts; Guidelines; High Schools; *Industrial Arts; *Layout (Publications); Learning Activities; Occupational Information; Printing; *Reprography; *Trade and Industrial Education
IDENTIFIERS *Graphic Communication; North Dakota

ABSTRACT

This course guide for a graphic arts course is one of four developed for the graphic communications area in the North Dakota senior high industrial arts education program. (Eight other guides are available for two other areas of Industrial Arts--energy/power and production.) Part 1 provides such introductory information as a definition and instructional objectives for Industrial Arts. Part 2 contains the course rationale and objectives; guidelines for implementation; taxonometric structure; course description including length, credit, prerequisites, and student competencies; suggested instructional units with required number of class periods; and 11 units. Each unit includes some or all of the following material: unit objective(s), topic outline, and selected student competencies to be developed through sample coordinated learning activities. Unit titles are Review of North Dakota Industrial Arts Curriculum Guide Level 1 for Graphic Communications Technology; Job Planning; Design Principles; Methods of Image Generation; Preproduction Methods; Production; Bindery, Finishing, and Packaging; Characteristics and Manufacturing of Materials Used in Graphic Arts; Reprographics Process Trouble Shooting; Graphic Arts Plant Operation; and Career Opportunities. A reference list is appended. (YLB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED209516

NORTH DAKOTA SENIOR HIGH
INDUSTRIAL ARTS
CURRICULUM GUIDES

GRAPHIC ARTS

(GRAPHIC COMMUNICATIONS)

INDUSTRIAL ARTS
SENIOR HIGH--LEVEL II

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

L. Barnhart

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

NORTH DAKOTA

NORTH DAKOTA STATE BOARD FOR
VOCATIONAL EDUCATION
Bismarck, North Dakota

CE030
561

NORTH DAKOTA SENIOR HIGH INDUSTRIAL ARTS CURRICULUM GUIDES

Myron Bender, Project Director
University of North Dakota
Department of Industrial Technology
Grand Forks, North Dakota

Supported by
The North Dakota State Board For Vocational Education
Research Coordinating Unit
900 East Boulevard
Bismarck, North Dakota 58505

Published By
Graphic Communications Laboratory
University of North Dakota
1981

The research reported herein was performed to a grant with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

PREFACE

One of the biggest challenges facing education today is keeping the instructional content current. Industrial Arts in particular must be quick to respond to changes in our technological society. For many years, North Dakota has offered quality industrial arts programs to students in the public schools. Credit for this is due to the teachers who have shown the desire to continually improve programs, keep their content current, and make instruction relevant.

The Industrial Arts curriculum has boundless potential for course and program development. However, this program possibility excites the imagination of teachers to offer endless number of courses which causes a need to determine what is of greatest value for students to experience.

Thus, the development of an appropriate or model curriculum requires a critical examination of several undergirding questions: What is the overall responsibility of Industrial Arts? What Industrial Arts goals are appropriate for the different grades or school levels? What courses constitute a meaningful curriculum for these goals to be realized? What shall be the scope and sequence of the total curriculum? The answers to these questions have been addressed by a North Dakota Industrial Arts Master Plan curriculum committee and are recorded in the North Dakota Senior High Industrial Arts Program of Studies booklet.

The Program of Studies describes the complete secondary school industrial arts education. The Program of Studies Booklet emphasizes the Level II Senior High programs with specific courses, course descriptions, objectives and units of instruction. The Junior High-Level I program is dealt with in a general basis for the purpose of articulating the two levels within the total secondary school industrial arts program.

Three types of Industrial Arts programs are included in the Program of Studies along with the individual courses which constitute the complete secondary school curriculum:

1. ORIENTATION AND EXPLORATION-- Level I program designed for grades seven through nine. The purpose of this program is to provide students with first-hand exploratory experiences in the four technical cluster areas. The learning experiences should provide an awareness of the impact of industry and it's associated technologies on the lives of individuals. Furthermore, this program assists individuals in making informed and meaningful occupational/career choices.
2. PERSONAL ENRICHMENT-- The program designed to prepare students with a general education of technolgical literacy, avocational skills and consumer information. This is purely an elective program of students for students who desire to gain an understanding of the technical concepts for personal satisfaction.
3. PRE-TECHNICAL-- This program provides concentrated and specialized technical courses for grades ten through twelve. These courses are articulated with the Level I technical cluster areas. Students at this level have a wide range of interests, abilities, and life aspirations. Therefore, the key element for the senior high pre-technical program is flexibility to meet the varied needs of learners. The program is designed to prepare students for advanced educational or training programs.

The North Dakota Senior High Program of Studies identified twelve different courses recommended to be offered in grades ten, eleven and twelve. The model curriculum lists four courses for each of three technical areas: (1) Energy/power,(2) Graphic Communications, and (3) Production. Individual course guides have been developed for each of the twelve courses recommended for the senior high curriculum. This being one of the twelve course guides. Similar guides have been developed for the remaining eleven.

Each course guide contains the course rationale, objectives,content, units and selected student competencies to be developed along with student learning activities. The primary aim of the course guides is to provide meaningful direction and still leave opportunity for individual teacher creative approaches in meeting the diverse needs of unique school populations. The course guides not only proposes to assist teachers and administrators in keeping their programs up-to-date, but also to promote industrial arts education program uniformity among North Dakota schools.

Ernest Breznay

Ernest Breznay
State Industrial Arts Supervisor
North Dakota State Board for Vocational Education
July, 1981

ACKNOWLEDGEMENTS

The North Dakota Industrial Arts profession is indebted to the following individuals who gave their time and talents in the development of the Twelve Senior High Industrial Arts course guides. These teachers and teacher educators attended an Organizational meeting, participated in a curriculum writing seminar, and developed individual course guides during 1980 & 1981.

PROJECT STAFF

Dr. Myron Bender, Project Director
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mr. Ernest Breznay, Coordinator
State Industrial Arts Supervisor
North Dakota State Board for
Vocational Education
Bismarck, North Dakota 58505

COURSE GUIDE WRITERS & CONSULTANTS

PRODUCTION COURSES

Dr. Robert Claus, Writer
Department of Industrial Education
Valley City State College
Valley City, North Dakota 58072

Mr. Isaac Hill, Writer
Langdon High School
Langdon, North Dakota 58249

Dr. Luvern R. Eickhoff, Consultant
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mr. Larry Gander, Writer
Mayville-Portland High School
Mayville, North Dakota 58257

Mr. Arlo Mittleider, Writer
Page High School
Page, North Dakota 58064

GRAPHIC COMMUNICATIONS COURSES

Mr. Eddie Poehls, Writer
Tolna High School
Tolna, North Dakota 58380

Mr. Keith Stenehjem, Writer
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Dr. Wan-Lee Cheng, Consultant
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mr. John Torgerson, Writer
Fargo South High School
Fargo, North Dakota 58102

Mr. Thomas Sweet, Writer
Bismarck High School
Bismarck, North Dakota 58501

ENERGY / POWER COURSES

Mr. Allen Lawrence, Writer
Thompson High School
Thompson, North Dakota 58278

Mr. Lyle Siedschlaw, Writer
Linton High School
Linton, North Dakota 58552

Dr. Don Mugan, Writer
Industrial Education Department
Valley City State College
Valley City, North Dakota 58072

Dr. John Sinn, Writer
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Dr. Herbert J. Auer, Consultant
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

STAFF ASSISTANTS

A special thanks is due to individuals who assisted with the design, layout, typing, and printing of the twelve industrial arts course guides.

Dr. Wan-Lee Cheng
Production Coordinator
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mrs. Sandy Tessier
Secretary/Typist
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mr. Paul Franzmeier, Artist
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mr. Keith Stenehjem
Production Assistant
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mrs. Roslyn O. Groomes
Comp/Set Typesetter
Department of Industrial Technology
University of North Dakota
Grand Forks, North Dakota 58202

Mr.Douglas Hisey, Jr.
Layout Assistant
Department of Industrial Technology
Grand Forks, North Dakota 58202

TABLE OF CONTENTS

Page

PART I: INTRODUCTION

-PREFACE ii
-ACKNOWLEDGEMENTS iv
-BASIC BELIEFS ABOUT INDUSTRIAL ARTS 1
-THE INDUSTRIAL ARTS MISSION & GOALS 2
-INSTRUCTIONAL OBJECTIVES 3
-NORTH DAKOTA INDUSTRIAL ARTS 4
-THE PROGRAM OF STUDIES 5
-PROGRAM STANDARDS 6
-COURSE CODE NUMBERS 7

PART II: GRAPHIC ARTS COURSE GUIDE (# 10052)

-RATIONALE & OBJECTIVES 9
-GUIDELINES FOR IMPLEMENTATION 10
-TAXONMETRIC STRUCTURE 17
-COURSE DESCRIPTION & SPECIFICATION 18
-SUGGESTED INSTRUCTIONAL UNITS 19
-INDIVIDUAL UNIT SPECIFICATIONS 20
(Unit Objectives, Content Outline, Selected Student Competencies & Sample Learning Activities):

UNIT #

I. Review the North Dakota Industrial Arts Curriculum Guide, Level I for Graphic Communications Technology Units: 20
4.00 Design
5.00 Image Generation
6.00 Preproduction
7.00 Production
8.00 Bindery
9.00 Careers
II. Job Planning 23
III. Design Principles 26
IV. Methods of Image Generation 28
V. Preproduction Methods 32
VI. Production 35
VII. Bindery, Finishing, and Packaging 39
VIII. Characteristics and Manufacturing of Materials Used in Graphic Arts 42
IX. Reprographics Process Trouble Shooting 47
X. Graphic Arts Plant Operation 52
XI. Career Opportunities 55

-REFERENCES 57

BASIC BELIEFS ABOUT INDUSTRIAL ARTS

INDUSTRIAL ARTS IS .....

- an educational discipline founded upon the knowledge base of technology - the means by which material things are produced.
- an instructional program affording boundless opportunities for learning how technology has been, is now and will be basic to human desires and needs.
- a fundamental educational program that can serve educational priorities, whether they are academic education, general education, vocational education, career education, ad. inf.
- an activity based curriculum enabling students to learn through doing.
- logically a discipline with a curriculum continuum from grade K through 12.

INDUSTRIAL ARTS IS JUSTIFIED BECAUSE .....

- all persons need to know about the technological environment, the material culture, and industry because they are economically, socially and emotionally affected by them.
- all persons must make a career choice from an extremely large and increasing number of occupations that are affected by technology; therefore, they should have opportunities to develop interests, uncover talents, explore technical and applied science fields and study occupations.
- all persons must select, buy, use, and maintain the products of industry -- houses, automobiles, appliances, clothes, furniture and items of a never ending list. A knowledge of products, their manufacture, characteristics, advantages and disadvantages makes for intelligent consumption.
- all persons need recreational, leisure time and avocational outlets.
- all persons need to have opportunities to develop planning, creative, problem solving and technical skills in harmony with their inherent desire to seek the better way.

INDUSTRIAL ARTS CAN HELP THE STUDENT TO .....

- gain an understanding of industry and technology.
- discover interests and talents.
- develop techniques in problem solving.
- develop basic skills in the safe use of tools and machines.
- make informed and meaningful occupational choices.
- acquire interests in avocational pursuits and hobbies.
- develop safe working habits.
- apply other school subjects.
- become a wiser consumer.
- develop creativity.
- develop pride in work well done.
- work cooperatively with others.

THE INDUSTRIAL ARTS MISSION

The mission of Industrial Arts Education is to assist the student in developing an understanding about industry and technology and in the discovery and development of individual potential.

GOALS

Consistent with their abilities, interests and educational needs:

1. Industrial Arts students at the middle or junior high school level will be aware of employment and/or self-employment opportunities and requirements for use in making career choices and in determining their educational programs.
2. Industrial Arts students at the senior high school level will acquire technical competencies in preparation for advanced vocational or technical education programs.
3. Industrial Arts students at the senior high school level will acquire competencies that lead to responsible citizenship through technological understanding, consumer knowledge and the productive use of leisure time.

INDUSTRIAL ARTS: AN OFFICIAL DEFINITION

Industrial Arts education programs means those education programs which pertain to the body of related subject matter, or related courses, organized for the development of understanding about the technical, consumer, occupational, recreational, organizational, managerial, social, historical, and cultural aspects of industry and technology including learning experiences involving activities such as experimenting, designing, constructing, evaluating, and using tools, machines, materials, and processes which provide opportunities for creativity and problem solving or assist individuals in the making of informed and meaningful occupational choices or which prepare them for entry into advanced trade and industrial or technical education programs.

INDUSTRIAL ARTS INSTRUCTIONAL OBJECTIVES

Industrial Arts students at the Senior High School Level will acquire competencies that lead to responsible citizenship through technological understanding, consumer knowledge and the productive use of leisure time. The program stresses the following instructional objectives:

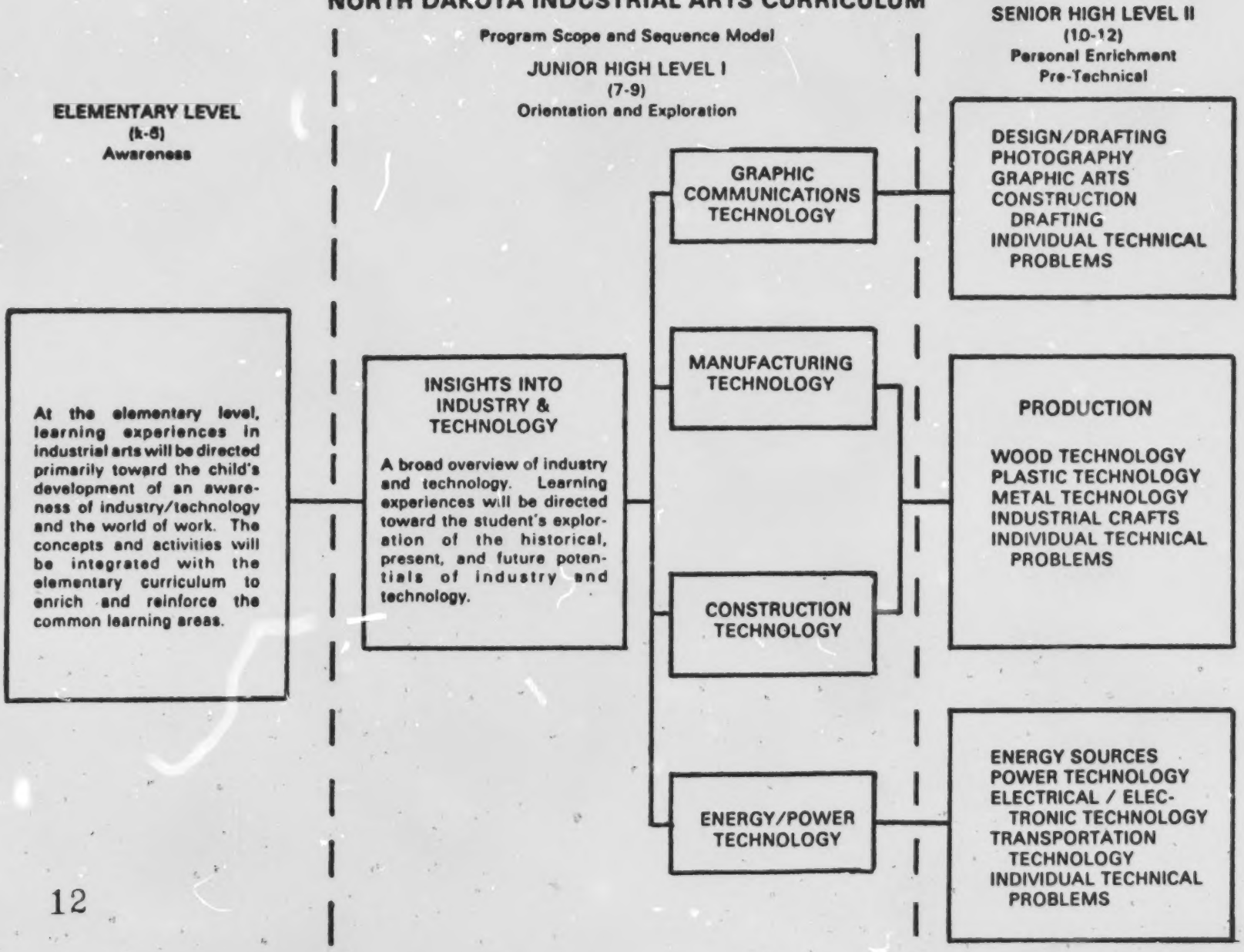
1. Develop an insight and understanding of industry and technology, its place in our society and the free enterprise system.
2. Discover and develop individual talents, aptitudes, interests, and potentials as related to industry and technology.
3. Develop an understanding of industrial processes and the practical application of scientific principles.
4. Develop technical problem-solving and creative abilities involving the use of materials, processes, and products of industry and technology.
5. Develop an understanding of industrial and technological career opportunities and their requirements and develop those traits which will help students obtain and maintain employment.

As determined by Title II of PL No. 94-482, the Vocational Education Act of 1976 and the State Board for Vocational Education, the purpose of funding industrial arts programs with vocational monies will be to:

1. Assist individuals in the making of informed and meaningful occupational and educational choices.
2. Prepare individuals for enrollment in advanced or highly skilled vocational and technical programs.

NORTH DAKOTA INDUSTRIAL ARTS CURRICULUM

Program Scope and Sequence Model


ELEMENTARY LEVEL
(k-6)
Awareness
At the elementary level, learning experiences in industrial arts will be directed primarily toward the child's development of an awareness of industry/technology and the world of work. The concepts and activities will be integrated with the elementary curriculum to enrich and reinforce the common learning areas.
JUNIOR HIGH LEVEL I
(7-9)
Orientation and Exploration
INSIGHTS INTO INDUSTRY & TECHNOLOGY
A broad overview of industry and technology. Learning experiences will be directed toward the student's exploration of the historical, present, and future potentials of industry and technology.
GRAPHIC COMMUNICATIONS TECHNOLOGY
MANUFACTURING TECHNOLOGY
CONSTRUCTION TECHNOLOGY
ENERGY/POWER TECHNOLOGY
SENIOR HIGH LEVEL II
(10-12)
Personal Enrichment
Pre-Technical
DESIGN/DRAFTING
PHOTOGRAPHY
GRAPHIC ARTS
CONSTRUCTION DRAFTING
INDIVIDUAL TECHNICAL PROBLEMS
PRODUCTION
WOOD TECHNOLOGY
PLASTIC TECHNOLOGY
METAL TECHNOLOGY
INDUSTRIAL CRAFTS
INDIVIDUAL TECHNICAL PROBLEMS
ENERGY SOURCES
POWER TECHNOLOGY
ELECTRICAL / ELECTRONIC TECHNOLOGY
TRANSPORTATION TECHNOLOGY
INDIVIDUAL TECHNICAL PROBLEMS

THE INDUSTRIAL ARTS PROGRAM OF STUDIES

LEVEL	GOAL	PROGRAM
II HIGH SCHOOL (Grades 10, 11, & 12)	1. Personal Enrichment 2. Pre-Technical	**GRAPHIC COMMUNICATIONS TECHNOLOGY** •Design/Drafting •Photography •Graphic Arts •Construction Drafting •Industrial Technical Problems **ENERGY/POWER TECHNOLOGY** •Energy Sources •Power Technology •Electrical/Electronic Technology •Transportation Technology •Individual Technical Problems **PRODUCTION TECHNOLOGY** •Wood Technology •Metal Technology •Plastic Technology •Industrial Crafts •Individual Technical Problems **INDIVIDUAL TECHNICAL PROBLEMS** (Multiple Offerings)
I JUNIOR HIGH SCHOOL (Grades 7, 8, &9)	1. Orientation 2. Exploration	•Insights into Industry and Technology •Graphic Communications Technology •Manufacturing Technology •Construction Technology •Energy/Power Technology

PROGRAM STANDARDS FOR INDUSTRIAL ARTS

ELEMENTS OF QUALITY INDUSTRIAL ARTS PROGRAMS

The success and quality of programs in industrial arts education depends upon elements that influence the quality of programs. Industrial arts must be responsive to the following elements:

A. GOALS AND OBJECTIVES: Program goals and objectives are established that provide the inspiration and guidance in program development, operation and evaluation.

B. INSTRUCTIONAL STAFF: The instructional staff is competent and meet necessary qualifications.

C. INSTRUCTIONAL PLAN: Selected subject matter is appropriate to learner's level and consistent with curriculum and course goals and objectives.

D. STUDENT ORGANIZATIONS: The establishment and operation of effective student organizations.

E. FACILITIES AND EQUIPMENT: Instructional facilities are well-designed, located and supportive of accomplishing curricular goals. (Refer to Educational Specifications for Industrial Arts Instructional Facilities Handbook, 1978.)

F. SPECIAL NEEDS: The program must provide for disadvantaged and handicapped students.

G. ADVISORY COMMITTEES: The establishment and effective use of industrial arts advisory committees.

H. GUIDANCE: The teacher's role in guidance.

I. ADMINISTRATION: Administration of the industrial arts program.

J. EVALUATION: Evaluation procedures are planned and implemented to assure continual program improvement.

NOTE: For further information on program standards, refer to the NORTH DAKOTA VOCATIONAL/TECHNICAL EDUCATION PROGRAM STANDARDS, Section 11.1 to 11.7.

INDUSTRIAL ARTS COURSE CODE NUMBERS
(Vocationally Funded)

Insights Into Industry and Technology	10001
Construction Technology	10011
Manufacturing Technology	10021
Wood Technology	10023
Metal Technology	10026
Plastic Technology	10029
Energy and Power Technology	10031
Electrical/Electronic Technology	10033
Energy Sources	10038
Power Technology	10039
Graphic Communications Technology	10051
Graphic Arts	10052
Design/Drafting	10053
Photography	10054
Construction Drafting	10056
Transportation	10061
Industrial Crafts	10080
Individual Technical Problems	10091
Individual Technical Problems	10092

PART II:

GRAPHIC ARTS COURSE GUIDE

(# 10052)

GRAPHIC ARTS

Rationale:

A study of graphic arts, within graphic communications provides an opportunity for a concentrated and specialized study of the reprographics industry. An atmosphere is provided for all students to develop pre-technical skills and knowledge into the economic, social, and technological aspects of visual communications in a changing society.

Graphic arts involves students in meaningful instructional activities and develops self-direction, learning, and creativity.

Course Objectives:

(1) This course is designed to acquaint students with current graphic arts materials, processes, methods, and techniques.

(2) Products related to the graphic arts industry will be designed and produced by the student, reflecting various graphic arts careers.

Guidelines For Implementation

Success in the classroom or laboratory depends on many factors. Foremost among these is the planning effort on the part of the teacher. Educational programs must be flexible and adaptable. They must be flexible enough to remain adaptable to all locales, in numerous types of facilities, and with students possessing differing values and interest. Therefore, a successful program must be capable of application in both small and large schools.

The industrial arts program recommended by these course guides are designed to meet individual student needs. They provide teachers with guidelines for a well balanced program with suggested teacher options in each of the three major technical study areas: (1) Graphic Communications; (2) Energy/Power; and (3) Production. The North Dakota secondary school industrial arts program suggests three levels of learning with an alternative curriculum approach at the Level II for those schools that cannot offer specific courses identified for each of the three technical study area due to the size of enrollments or other limiting factors.

Graphic Communications Technical Area Guidelines

The recommended scope and sequence of course offerings for the graphic communications technical study area is illustrated on the sample program model on page 13. The Level I course serves as an orientation and exploratory learning experience and is recommended as a prerequisite to the four specific courses listed at Level II. The senior high Level II courses provide concentrated and indepth exploratory experiences in the four major components involved in Graphic Communications: (1) Design/Drafting; (2) Graphic Arts; (3) Construction Drafting; and (4) Photography. Since students at this level display a wide range of interests, abilities, and life goals, the industrial arts program must provide a variety of learning and course options to meet individual student needs. To meet the varied student needs, it is recommended that the specific course options be made available to students when possible. For the smaller and mid-sized schools, it may not be feasible to offer all four of the specific courses identified in Level II. If that should be the case, it is recommended that one or two of the courses be offered and an ITP (Individual Technical Problems) course be offered as a Level II alternative. (See ITP Course specifications on page 14.) This course is designed to provide multiple learning experiences in graphic communications to meet individual needs.

The Level III ITP Course (Code #10092) is suggested for students in larger programs who have had the Level II indepth exploratory courses in graphic communications and desire to study a specialized aspect related to design/drafting, graphic arts, construction drafting, and/or photography. (See pages 15 and 16 for specific Level III ITP Course specifications and technical problem options).

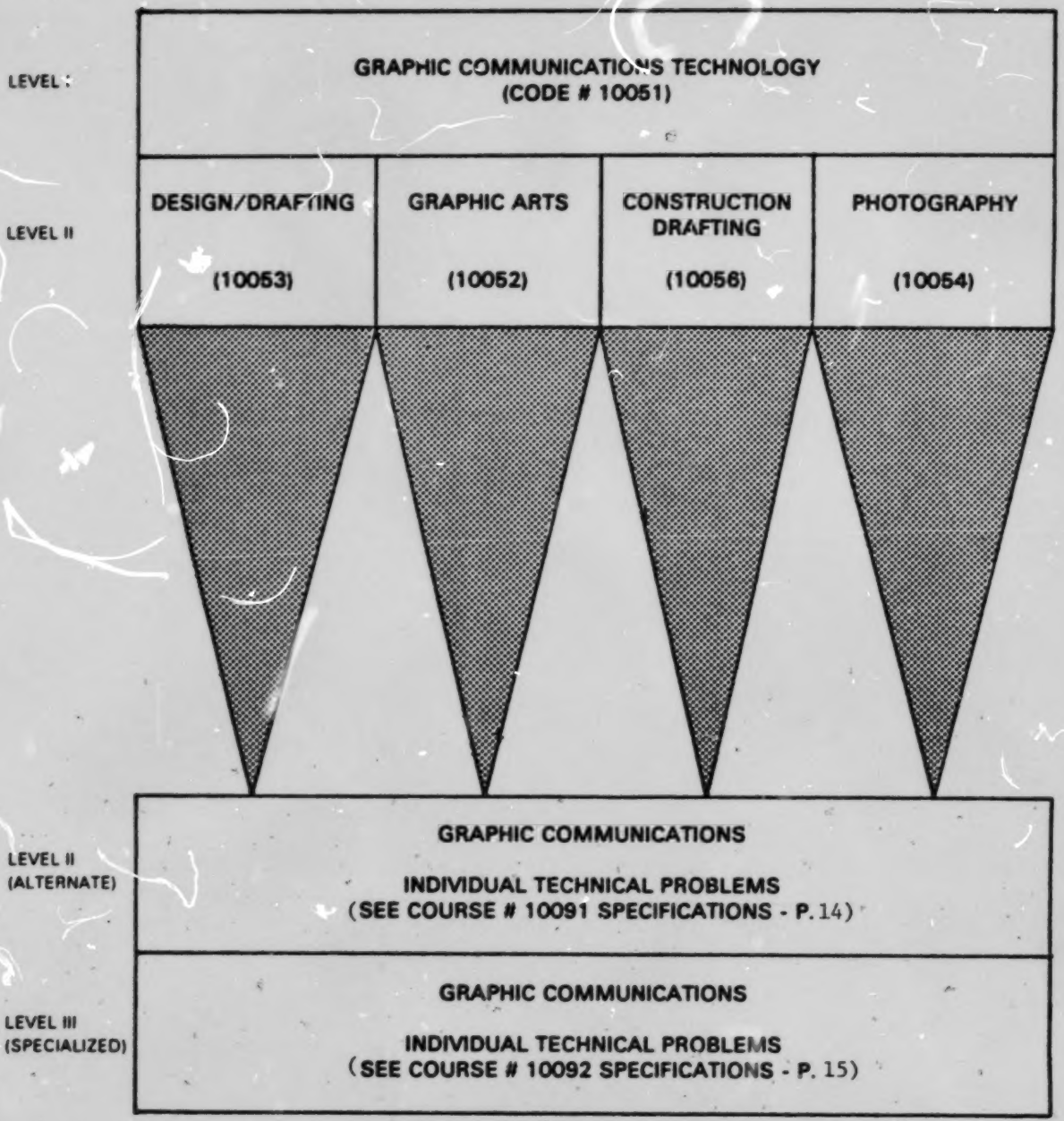
Guidelines For Implementing the Graphic Arts Course

This Instructional Guide is designed to assist teachers, supervisors, administrators, and teacher-educators as they organize an industrial arts course in graphic arts within graphic communications in the State of North Dakota.

This guide will provide the instructor with suggested procedures, learning activities, and course resources to assist in setting up a program which corresponds to the students needs. It is a fact, the school day is limited in time and it is difficult to locate and acquire the vast amount of available materials. However, the instructor in this field will choose concepts most applicable to his or her school.

As the instructor, responsible for implementing the content of this guide, he or she should notice that the graphic arts course is designed for either 18 or 36 weeks. The content of the 18 week course is identified by the suggested instructional units preceeded by an asterisk. It is recommended that the student acquires graphic communications, Level I as a pre-requisite to this course.

Texts indicated in this guide, are used only as examples. The instructor may select the text which is applicable to his or her needs.



Sample Program Model

INDIVIDUAL TECHNICAL PROBLEMS

COURSE CODE: 10091

This individual technical problem course is designed for students who have not had the opportunity to enroll in specific Level II subject matter courses in the Graphic Communications Technology cluster area. The course is designed to provide a means for meeting individual student needs through the offering of multiple activities in a number of technical areas in schools where separate courses are not available.

INDUSTRIAL ARTS PURPOSE

Personal Enrichment

Pre-Technical

GRADE LEVEL

11 - 12

COURSE LENGTH

One period per day

18 or 36 weeks

UNIT OF CREDIT

½ or 1 unit

RECOMMENDED PREREQUISITES

Level I Curriculum Courses

SELECTED STUDENT COMPETENCIES

NOTE: Individual student competencies and learning experiences are to be identified and developed on a contractual basis by the student and approved by the instructor for each problem.

SAMPLE LEARNING TOPICS

NOTE: Learning topics for the ITP are to be selected from the instructional units identified for each specific subject matter course. These courses include:

GRAPHIC COMMUNICATIONS:

-- Design/Drafting, 10053
-- Photography, 10054
-- Graphic Arts, 10052
-- Construction Drafting, 10056

INDIVIDUAL TECHNICAL PROBLEMS: GRAPHIC COMMUNICATIONS

COURSE CODE: 10092

This individual technical problem course is designed for students who have had the Level II preliminary courses of this cluster in the chosen area of study and intend to study specific advanced information and techniques in design/drafting, photography, graphic arts, and/or construction drafting.

INDUSTRIAL ARTS PURPOSE

Personal Enrichment

Pre-Technical

GRADE LEVEL

11 - 12

COURSE LENGTH

One period per day

18 or 36 weeks

UNIT OF CREDIT

½ or 1 unit

RECOMMENDED PREREQUISITES

See Course Description

Instruction in this industrial arts course is open to meet students needs. The following suggested objectives are meant to provide ideas for developing the student's program.

1. To prepare for seeking advanced education in the area of graphic communications.
2. To provide students the experiences in problem-solving, research and development with regard to any specific chosen means in graphic communications.
3. To provide students information regarding industrial materials, processes and the practical applications of scientific principles.
4. To provide students an understanding of industry, its place in society, and the free enterprise system.
5. To provide students an understanding in related career opportunities in graphic communications.

10092
COURSE CODE

INDIVIDUAL TECHNICAL PROBLEMS: GRAPHIC COMMUNICATIONS

SAMPLE LEARNING TOPICS

DESIGN/DRAFTING:
Design/drafting as pertains to:

I. Aerospace Engineering
II. Civil Engineering
III. Electrical/Electronic Engineering
IV. Geological Enginering
V. Mechanical Engineering
VI. Marine Engineering
VII. Nuclear Engineering
VIII. Production Industry

PHOTOGRAPHY:

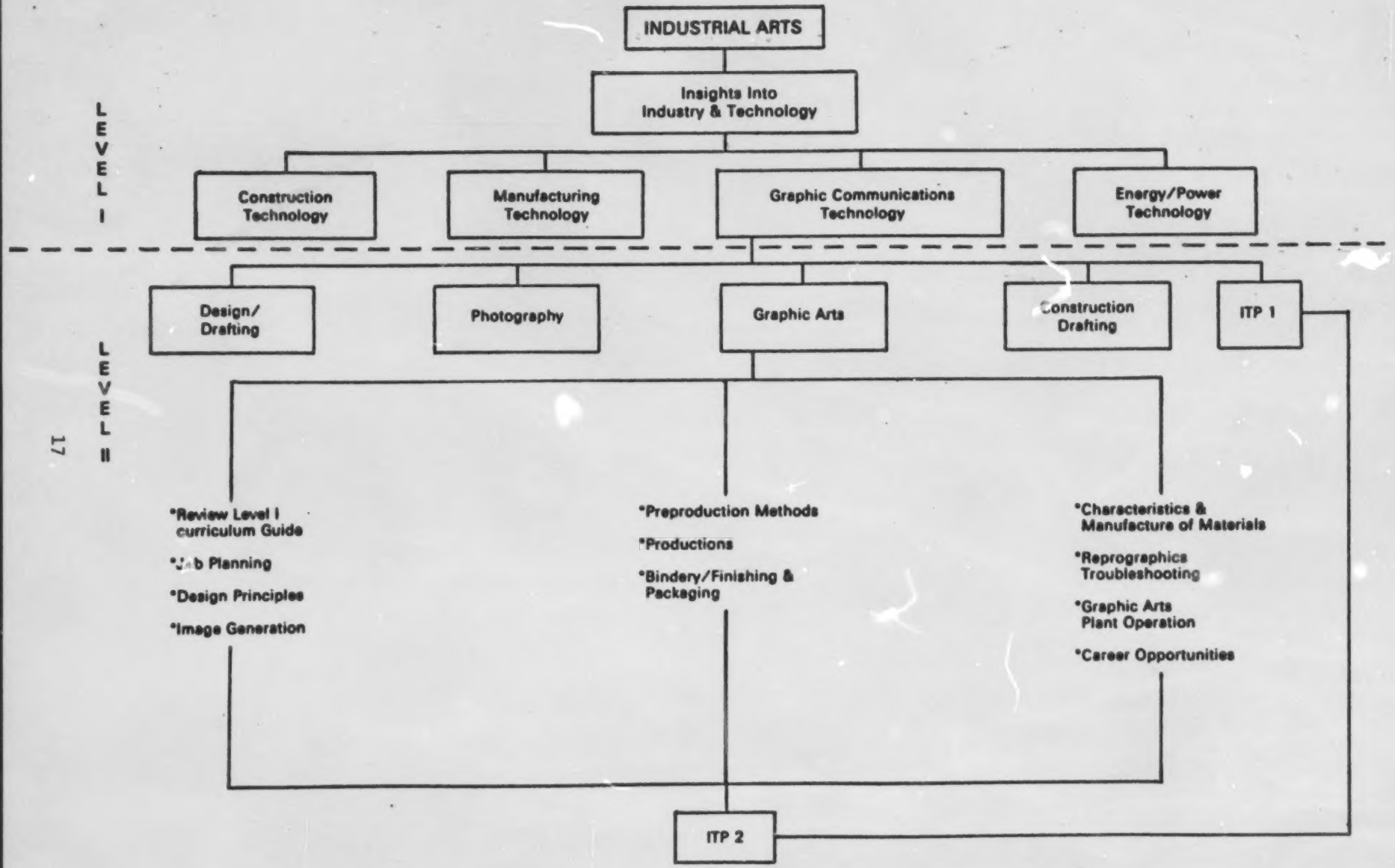
I. Photography Education
II. Basic Sensitometry
III. Characteristics and Applications of Various Photographic Materials
IV. Basic Scientific Photography
V. Portrait Photography
VI. Color Theory and Color Photography
VII. Safety and Health Hazards with Photographic Chemicals
VIII. Career Opportunities in Photography Related Industry

GRAPHIC ARTS:

I. Photo-Offset Process
II. Advanced Screen Printing Techniques
III. Color Separation and Reproduction
IV. Reproduction Techniques for Audio-Visual Materials
V. Modern Image Generation Methods
VI. Special Effect Reproduction
VII. Advanced Layout and Design
VIII. Market and Cost Analysis

CONSTRUCTION DRAFTING:

I. Advanced Construction Drafting Education
II. Planning and Design Considerations
III. Resource Materials for Construction Drafting
IV. Color Illustrations and Presentation Drawings
V. Architectural Model Making
VI. Landscaping Design
VII. Interior Design


INDUSTRIAL ARTS
Insights Into Industry & Technology
LEVEL I
Construction Technology
Manufacturing Technology
Graphic Communications Technology
Energy/Power Technology
LEVEL II
Design/ Drafting
Photography
Graphic Arts
Construction Drafting
ITP 1
*Review Level I curriculum Guide
*Job Planning
*Design Principles
*Image Generation
*Preproduction Methods
*Productions
*Bindery/Finishing & Packaging
*Characteristics & Manufacture of Materials
*Reprographics Troubleshooting
*Graphic Arts Plant Operation
*Career Opportunities
ITP 2

GRAPHIC ARTS

COURSE CODE: 10052

This course is designed to acquaint students with current Graphic Arts processes, methods, and techniques. Through learning experiences, products related to the Graphic Arts industry will be designed and produced by individual student.

INDUSTRIAL ARTS PURPOSE

Personal Enrichment

Pre-Technical

GRADE LEVEL

10 - 12

COURSE LENGTH

One period per day

18 or 36 weeks

UNIT OF CREDIT

½ or 1 unit

RECOMMENDED PREREQUISITES

Graphic Communications Technology, 10051

SELECTED STUDENT COMPETENCIES

Experiences and activities of this industrial arts course will enable the student to:

1. Plan effectively for reprographics products.
2. Analyze and evaluate the importance of design principles.
3. Analyze various processes used in the graphic arts industry.
4. Practice efficient and safe use of equipment and materials commonly found in the graphic arts industry
5. Become knowledgeable of the interrelatedness of various elements of the graphic arts industry
6. Develop products using the processes found in the graphic arts industry.
7. Identify the role of reprographics management.
8. Determine the need for production control.
9. Evaluate various aspects of graphic arts careers.

10052
Course Code

GRAPHIC ARTS

Suggested Instructional Units

		Class Periods (18 wks)	(36 wks)
*I.	Review the North Dakota Industrial Arts Curriculum Guide, Level I for Graphic Communications Technology Units: 4.00 Design 5.00 Image Generation 6.00 Preproduction 7.00 Production 8.00 Bindery 9.00 Careers	10	10
*II.	Job Planning	5	10
*III.	Design Principles	10	20
*IV.	Methods of Image Generation	15	25
*V.	Preproduction Methods	10	10
*VI.	Production	25	50
*VII.	Bindery, Finishing, and Packaging	10	10
VIII.	Characteristics and Manufacturing of Materials Used in Graphic Arts		15
IX.	Reprographics Process Trouble Shooting		15
X.	Graphic Arts Plant Operation		10
XI.	Career Opportunities	5	5
	TOTAL	90	180

* Recommended units of instruction for an 18-week course.

UNIT I

Review the North Dakota Curriculum Guide for Graphic Communications

OBJECTIVES:

This unit is meant to provide a student with:

1. A review of graphic arts techniques, processes, materials, and career awareness.

1.0.0 Message Analysis

- 1.1.0 What is a message
- 1.2.0 Why send a message
- 1.3.0 Who-Why-Where of a message

2.0.0 Layout

- 2.1.0 Typography
- 2.2.0 Drafting the layout
  - 2.2.1 Thumbnail
  - 2.2.2 Rough layout
  - 2.2.3 Comprehensive layout
  - 2.2.4 Mechanical layout

3.0.0 Image Generation

- 3.1.0 Hot type
- 3.2.0 Cold type

4.0.0 Preproduction

- 4.1.0 Materials
- 4.2.0 Processes
  - 4.2.1 Proofreading
  - 4.2.2 Film types
  - 4.2.3 Stripping
  - 4.2.4 Plate making
  - 4.2.5 Presses

UNIT I

5.0.0 Production

- 5.1.0 Relief
- 5.2.0 Stencil
- 5.3.0 Intaglio
- 5.4.0 Offset
- 5.5.0 Continuous tone photography
- 5.6.0 Electrostatic

6.0.0 Bindery

- 6.1.0 Binding
- 6.2.0 Finishing and packaging

7.0.0 Careers

- 7.1.0 Classification
- 7.2.0 Career opportunities

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT I: Review the North Dakota Curriculum Guide for Graphic Communications

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Identify various methods used to generate an image.	A.1 Observe a piece of hot type and locate the various parts.
	A.2 Collect samples of hot and cold image generations from existing printed materials.
B. Identify the design principles of initial images.	B.1 Collect samples of pictures depicting good and poor design principles from various magazine samples.
C. Differentiate between graphic reproduction methods.	C.1 Write a short paragraph about various production methods.
	C.2 Collect pictures depicting various reproduction methods.
D. Describe the different methods of binding, finishing, and packaging.	D.1 Collect samples of various bindery, finishing, and packaging.

UNIT II

Job Planning

OBJECTIVES:

This unit is meant to provide a student with:

1. The ability to plan a job and produce a layout suitable for camera copy.
2. An understanding of the materials and equipment currently used in the graphic arts industry

1.0.0 Message Analysis

- 1.1.0 What is the message
- 1.2.0 Why send a message
- 1.3.0 Who is message sent to
- 1.4.0 When message is sent
- 1.5.0 How message is sent
- 1.6.0 Where is message sent

2.0.0 Job Planning

- 2.1.0 Equipment and materials
  - 2.1.1 Basic drafting equipment
  - 2.1.2 Preportional rules,etc.
- 2.2.0 Thumbnail layouts
- 2.3.0 Rough layouts
- 2.4.0 Comprehensive
- 2.5.0 Mechanical

UNIT II

3.0.0 Copyfitting

- 3.1.0 Display type
- 3.2.0 Text or body type
- 3.3.0 Pica-P.. size,etc.
- 3.4.0 Leading between lines

4.0.0 Illustrations

5.0.0 The Dummy

- 5.1.0 Layout each page
- 5.2.0 Type faces, sizes, length of line,etc.
- 5.3.0 Trim lines
- 5.4.0 Margins

SELECTED STUDENT COMPETENCIES AND SAMPLE LEARNING ACTIVITIES FOR

Graphic Arts

UNIT II: Job Planning

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Analyze a message in regards to the message content, purpose of message, and the nature of the message.	A.1 With the assistance of a partner, role play the gathering of information of a message and proceed with the beginning planning stages.
B. Determine the cost, quantity and the manner of reproduction.	B.1 Estimate the cost, based upon the number of copies and the selected manner of reproduction of the role message in the above activity.
C. Identify specific layout tools.	C.1 Students will examine various layout tools and observe a demonstration on each specific use.
D. Describe the purpose of the thumbnail, rough layout, comprehensive, and mechanical camera copy.	D.1 Students will prepare thumbnail sketches. D.2 Students will refine the thumbnail sketches to the comprehensive layout form. Students will have notes, symbols, etc. in regards to the finished article ready to hand in.

UNIT III

Design Principles

OBJECTIVES:

This unit is intended to provide a student with:

1. The ability to identify the six principles of design
2. Apply and analyze a design based upon the design principles

1.0.0 Design is a Plan

2.1.0 Proportion

- 2.1.1 Page proportion
- 2.1.2 Element proportion

2.2.0 Balance

- 2.2.1 Informal balance
- 2.2.2 Formal balance
- 2.2.3 Optical and true centers

2.3.0 Contrast

- 2.3.1 Change type size
- 2.3.2 Use capital letters
- 2.3.3 Use small capital letters
- 2.3.4 Different type
- 2.3.5 Italic type
- 2.3.6 Underline
- 2.3.7 Symbols
- 2.3.8 Box the word
- 2.3.9 (Others)

2.4.0 Rhythm

2.5.0 Unity

2.6.0 Color

- 2.6.1 Attracts attention
- 2.6.2 Holds attention
- 2.6.3 Color communicates
- 2.6.4 Provide emphasis

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT III: Design Principles

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Apply the principles of design.	A.1 Students will use the six principles of design while designing his or her product to be printed.
	A.2 Students will write a description of each principle of design.
	A.3 The class is divided in groups. Each group selects a design principle, compiles information, and then reports back to the class.
B. Demonstrate different techniques of achieving the contrast principle of design.	B.1 Students will collect samples of how each method of contrast is achieved by reviewing magazine samples.
C. Describe how rhythm and unity relate to design.	C.1 Students will gather samples indicating rhythm and unity as design principles.
D. List four reasons how color contributes to the principles of design.	D.1 Discuss how color can emphasize, attract and hold attention and communicate to another person.
Define the major elements of production and consumption of goods and services, including design, composition of materials, purchasing, processing, and delivery.	

UNIT IV

Methods of Image Generation

OBJECTIVES:

This unit is meant to provide a student with:

1. The ability to describe the difference between hot and cold type generation methods
2. The ability to describe the relationships that exist between the units of measurement that comprise the printers point systems

1.0.0 Kinds of Type Composition

- 1.1.0 Hot type
- 1.2.0 Cold type

2.0.0 Type Faces

- 2.1.0 Text type
- 2.2.0 Roman
- 2.3.0 Old style
- 2.4.0 Modern
- 2.5.0 Sans serif
- 2.6.0 Squire serif
- 2.7.0 Script
- 2.8.0 Novelty
- 2.9.0 Others

3.0.0 Point System

- 3.1.0 Line gauge

4.0.0 Type Size

- 4.1.0 Hot type size
- 4.2.0 Cold type size

UNIT IV

5.0.0 Illustrations

- 5.1.0 Freehand drawing
- 5.2.0 Existing copy
- 5.3.0 Clip out

6.0.0 Hand Set Hot Type

- 6.1.0 Wood type
- 6.2.0 Foundry type
  - 6.2.1 California job case
  - 6.2.2 Characters
  - 6.2.3 Punctuation
  - 6.2.4 Numerals
  - 6.2.5 Spaces and quads
- 6.3.0 Composing stick
  - 6.3.1 Spacing between lines
  - 6.3.2 Rules
  - 6.3.3 Borders
- 6.4.0 Type composition
  - 6.4.1 Setting type flush left
  - 6.4.2 Setting type flush right
  - 6.4.3 Setting type on center
  - 6.4.4 Justification

7.0.0 Machine Set Hot Type

- 7.1.0 Monotype
- 7.2.0 Linotype and intertype
- 7.3.0 Ludlow

8.0.0 Mechanical Cold Type Composition

- 8.1.0 Preprinted types and lettering devices
- 8.2.0 Dry transfer type
- 8.3.0 Pressure sensitive
- 8.4.0 Handset paper type

UNIT IV

8.5.0 Lettering devices

8.6.0 Typewriter

8.7.0 Leroy lettering set

8.8.0 Kroy lettering machine

8.9.0 Others

9.0.0 Photographic Cold Type Composition

9.1.0 Photo composition

- 9.1.1 Strip printer
- 9.1.2 Headliner
- 9.1.3 Others

9.2.0 Text Phototypesetters

- 9.2.1 1st generator
- 9.2.2 2nd generator
- 9.2.3 3rd generator
- 9.2.4 4th generator

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT IV: Methods of Image Generation

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Identify various methods of image generation, namely hot and cold type.	A.1 Students will examine various pieces of hot type. A.2 Field trip to a local print shop. A.3 Observe samples of different image generation methods.
B. Describe the three methods of composition, mechanical, and computer aided composition.	B.1 Use mechanical cold composition to prepare camera ready copy. B.2 Students may collect samples of various mechanical composition methods from laboratory supplies. B.3 Use various lettering machines. B.4 Use various photographic typesetting machines. B.5 Observe a computer aided typesetter in use. B.6 Type and justify copy.

UNIT V

Preproduction Methods

OBJECTIVES:

This unit is meant to provide a student with:

1. The ability to describe the manufacturing processes involved in produced graphic arts materials

2. The necessary competence to perform the processes necessary prior to actual production

1.0.0 Material

1.1.0 Ink selection

1.2.0 Paper selection

1.3.0 Proofreading

1.3.1 Symbols

1.4.0 Film types

1.4.1 Ortho film
1.4.2 Lighting
1.4.1.1 Chemicals
1.4.1.2 Lighting
1.4.1.3 Development

1.4.2 Panchromatic film

1.4.2.1 Chemicals
1.4.2.2 Lighting
1.4.2.3 Development

1.5.0 Process camera

1.5.1 Lighting
1.5.2 Line photography
1.5.3 Halftone photography

1.5.3.1 Screens
1.5.3.2 Exposure
1.5.3.3 Dot pattern

1.5.4 Preproduction size reproduction

1.5.4.1 Proportion scale

1.5.5 Halftone

1.5.5.1 Density (Sensitivity)
1.5.5.2 Exposure computer

2.0.0 Stripping

2.1.0 Equipment/supplies

2.1.1 Light table
2.1.2 Exacto knives
2.1.3 Golden rod
2.1.4 Litho tape
2.1.5 Opaque

2.2.0 Care of the flat

3.0.0 Plate Making

3.1.0 Plates

3.1.1 Paper
3.1.2 Metal

3.2.0 Exposing unit

3.3.0 Development

3.4.0 Care of plate

3.5.0 Plate storage

4.0.0 Presses

4.1.0 Pre-production operations

4.1.1 Placing plate on the press
4.1.2 Setting paper guides
4.1.3 Setting delivery & rolls
4.1.4 Mix fountain solution
4.1.5 Wet plate
4.1.6 Turn on water
4.1.7 Turn on ink rollers
4.1.8 Trial run
4.1.9 Final adjustments

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT V: Preproduction Methods

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Describe differences between inks used for specific purposes.	A.1 Observe characteristics of various inks. A.2 Ink consistency, tackiness, etc.
B. Describe difference between different kinds of paper.	B.1 Collect samples of different kinds of paper. B.2 Discuss the characteristics of various kinds of paper.
C. Explain the use of the various kinds of film.	C.1 Discuss the characteristics of different photographic film and how each relates to a specific method of reproduction.
D. Prepare the process camera for line photography and expose a negative.	D.1 Set lights and expose a piece of film to line copy, develop, etc.
E. Prepare the process camera and contact screen to produce a halftone negative.	E.1 Expose a piece of film producing a halftone negative using a contact screen.
F. Prepare a properly stripped flat, expose, and develop the plate.	F.1 Prepare a flat with, correction made and ready for exposure of the flat.
G. Prepare the press for the production run.	G.1 Expose the plate, using a platemaker. G.2 Develop the plate, and prepare for storage.

UNIT VI

Production

OBJECTIVES:

This unit is meant to provide a student with:

1. Knowledge of the various screen printing methods, hand cut, photo direct & indirect methods

2. Knowledge of the processes involved in the preparation of various masters such as spirit and numograph masters

3. Ability to describe the operating principles of various presses & production techniques related to the graphic arts industry

1.0.0 Relief

- 1.1.0 Letter press
  - 1.1.1 Preproduction presentation
  - 1.1.2 Press operation
  - 1.1.3 Post press operation

2.0.0 Intaglio

- 2.1.0 Intaglio process
  - 2.1.1 Process
  - 2.1.2 Types of intaglio methods
- 2.2.0 Intaglio image carrier
- 2.3.0 Intaglio press

3.0.0 Offset

- 3.1.0 Offset process
  - 3.1.1 Theory
  - 3.1.2 Process
- 3.2.0 Offset press
  - 3.2.1 Offset systems
  - 3.2.2 Basic components
  - 3.2.3 Types of offset presses

3.3.0 Press operation

- 3.3.1 Place plate on press
- 3.3.2 Setting guides
- 3.3.3 Setting delivery & rolls
- 3.3.4 Mix fountain solution
- 3.3.5 Wet plate
- 3.3.6 Turn on water
- 3.3.7 Turn on ink rollers
- 3.3.8 Trial run & adjustments
- 3.3.9 Press wash-up

4.0.0 Stencil

4.1.0 Paper

- 4.1.1 Equipment

4.2.0 Handcut materials & supplies

- 4.2.1 Film
- 4.2.2 Exacto knife
- 4.2.3 Block out

4.3.0 Photographic (direct & indirect)

- 4.3.1 Equipment
  - 4.3.1.1 Camera
  - 4.3.1.2 Film
  - 4.3.1.3 Chemicals
  - 4.3.1.4 Screen
  - 4.3.1.5 Exposing unit

5.0.0 Continuous Tone Photograph

5.1.0 Black & white

- 5.1.1 Contact printing
  - 5.1.1.1 Equipment
  - 5.1.1.2 Chemicals

5.2.0 Enlarging

- 5.2.1 Equipment
- 5.2.2 Materials
- 5.2.3 Chemicals

UNIT VI

5.3.0 Color

- 5.3.1 Equipment
- 5.3.2 Chemicals
- 5.3.3 Materials

6.0.0 Electro-Static

SELECTED STUDENT COMPETENCIES AND SAMPLE LEARNING ACTIVITIES FOR

Graphic Arts

UNIT VI: Production

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Describe the relief process of reproduction.	A.1 Carve a linoleum block.
	A.2 Observe standard typewritter in operation.
	A.3 Visit a printing shop.
B. Describe the gravure process.	B.1 Prepare a dry point etch exhibiting the gravure process.
C. Describe the offset theory.	C.1 Observe the offset theory by observing the plate, blanket, and the printed article.
	C.2 Discuss the grease-water theory.
D. Explain the offset system.	D.1 Discuss the various systems found on an offset press.
E. Operate the offset press safely and correctly.	E.1 Attach plate, make adjustments and make the production run.
	E.2 Observe film "We Used to Call It Printing".
F. Describe the screen printing processes and the application of this reproduction process.	F.1 Prepare a hand cut stencil.
	F.2 Prepare a direct or indirect photographic stencil.
G. Describe the photographic theory, continuous tone black & white, the photographic process, and color theory.	G.1 Students will expose, develop, and print a roll of black & white film.
	G.2 Students will print the negative both by contact printing and an enlargement.

UNIT VII

Bindery, Finishing, and Packaging

OBJECTIVES:

This unit is meant to provide a student with:

1. An appreciation for various bindery processes
2. The ability to describe the differences between the various finishing techniques
3. The knowledge to describe various methods of packaging materials

1.0.0 Bindery

- 1.1.0 Saddle wire
- 1.2.0 Side wirebinding
- 1.3.0 Sewn soft cover binding
- 1.4.0 Sewn case bound
- 1.5.0 Adhesive
- 1.6.0 Mechanical
- 1.7.0 Loose leaf
  - 1.7.1 Binding post
  - 1.7.2 Ring binder

2.0.0 Finishing

- 2.1.0 Cutting
  - 2.1.1 Operating a paper cutter
  - 2.2.2 Safety
- 2.2.0 Folding
- 2.3.0 Gathering
- 2.4.0 Scoring
- 2.5.0 Perforating

UNIT VII

2.6.0 Drilling

2.7.0 Embossing

2.8.0 Die cutting

3.0.0 Packaging

3.1.0 Shrink wrap

3.2.0 Paper wrapper

3.3.0 Plastic bags

3.4.0 Boxes

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT VII: Bindery, Finishing, and Packaging

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Differentiate between the various methods of bindery.	A.1 Produce a booklet using one binding method. A.2 Collect samples of methods of binding. A.3 Use side binding, or saddle wire method of binding.
B. Describe the various finishing techniques.	B.1 Trim paper, fold, punch, and drill the paper.
C. Discuss the purpose of finishing and binding.	C.1 Gather, collate and insert material.
D. Discuss the importance of packaging in graphic arts.	D.1 Discuss methods of packaging.

UNIT VIII

Charateristics & Manufacturing of Materials Used in Graphic Arts

OBJECTIVES:

This unit is meant to provide a student with:

1. The necessary information to make correct material selection based upon product need and application
2. The information required to discuss the characteristics of materials
3. The information required to discuss the methods of manufacturing materials

1.0.0 Pulp & Paper Manufacturing

- 1.1.0 Wood sources
- 1.2.0 Processes of pulp manufacturing
  - 1.2.1 Debarking
  - 1.2.2 Chipping
  - 1.2.3 Pulping
    - 1.2.3.1 Chemical
    - 1.2.3.2 Mechanical
    - 1.2.3.3 Combination
  - 1.2.4 Bleaching
    - 1.2.4.1 Peroxide
  - 1.2.5 Beating & refining
    - 1.2.5.1 Repulping
  - 1.2.6 Additives
    - 1.2.6.1 Inter-fiber bonding
    - 1.2.6.2 Optical & physical properties
    - 1.2.6.3 Internal sizing
    - 1.2.6.4 Dye stuffs & pigments
  - 1.2.7 Cleaning
    - 1.2.7.1 Screening
    - 1.2.7.2 Centricleaner

UNIT VIII

2.0.0 Paper Manufacturing

- 2.1.0 Forming paper
- 2.2.0 Watermarks
  - 2.2.1 Dandy roll method
  - 2.2.2 Rubber stamp roll method
- 2.3.0 Water removal
  - 2.3.1 Sizing
  - 2.3.2 Drying
- 2.4.0 Methods of manufacturing paper
  - 2.4.1 Fourdrinier
  - 2.4.2 Cylinder
  - 2.4.3 Inverform
- 2.5.0 Finishing
  - 2.5.1 Inspecting
  - 2.5.2 Sheeting
  - 2.5.3 Special finishing
  - 2.5.4 Packaging
- 2.6.0 Kinds, weights & sizes of paper
  - 2.6.1 Basic weight
  - 2.6.2 Standard sizes
  - 2.6.3 Kinds of paper
    - 2.6.3.1 Bond
    - 2.6.3.2 Book
    - 2.6.3.3 Bristal
    - 2.6.3.4 Cover
    - 2.6.3.5 Ledger
    - 2.6.3.6 Offset
    - 2.6.3.7 Text
    - 2.6.3.8 Newsprint
    - 2.6.3.9 Duplicator
    - 2.6.3.10 Mimeograph
  - 2.6.4 Recycled paper
  - 2.6.5 Determining cost
    - 2.6.5.1 Weight
    - 2.6.5.2 Size
    - 2.6.5.3 Ream

UNIT VIII

3.0.0 Printing Ink Manufacturing

3.1.0 Composition

3.1.1 Vehicles

3.1.1.1 Non-drying
3.1.1.2 Drying - oil

3.1.2 Pigments

3.1.2.1 Black pigments
3.1.2.2 White pigments

3.1.3 Driers
3.1.4 Waxes
3.1.5 Greases and lubricants

3.2.0 Printing inks

3.2.1 Letterpress
3.2.2 Lithography
3.2.3 Gravure
3.2.4 Screen printing

3.3.0 Substrate

3.3.1 Paper
3.3.2 Non-paper

3.4.0 Types of inks

3.4.1 Heat-set ink
3.4.2 Quick-set oil ink
3.4.3 Gloss ink
3.4.4 News ink
3.4.5 Metallic ink
3.4.6 Magnetic ink

3.5.0 Ink difficulties

3.5.1 Off color
3.5.2 Set off
3.5.3 Improper drying
3.5.4 Sticking
3.5.5 Chalking
3.5.6 Specking
3.5.7 Strike-through
3.5.8 Plate wear

UNIT VIII

4.0.0 Mixing Inks

- 4.1.0 Tools
  - 4.1.1 Slab
  - 4.1.2 Knife
  - 4.1.3 Scales
- 4.2.0 Ingredients
- 4.3.0 Mixing
  - 4.3.1 Hue
  - 4.3.2 Value
  - 4.3.3 Chroma

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT VIII: Characteristics & Manufacturing of Materials Used in Graphic Arts

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Describe the process of manufacturing paper.	A.1 Discuss the manufacture of paper.
	A.2 Using a kit, produce hand made paper.
	A.3 Visit the paper manufacturing industry.
B. Select the proper kind of paper stock for a particular job.	B.1 Discuss various kinds of paper and collect samples of each kind and include in a notebook.
C. Differentiate between different kinds, sizes, and weights of paper.	C.1 Examine various paper stocks for finish, weight, grain, etc.
D. List the components use. in the manufacture of ink.	D.1 Research the manufacturing of ink and write a report on the findings.
E. Select the proper ink matched to a specific job.	E.1 Examine various inks, notice the characteristics of each and for which reproduction it is used.
F. Solve problems related to specific ink problem, example, improper drying.	F.1 Observe ink samples in regards to drying time, describe how inks can be altered.
	F.2 Discuss the process of mixing ink to arrive at various colors.

UNIT IX

Reprographics Process Trouble Shooting

OBJECTIVES:

This unit is meant to provide a student with:

1. The familiarity of graphic arts materials, processes, and techniques, that will allow for troubleshooting basic problems that will be encountered.

2. An appreciation for graphic arts materials and their limitations

1.0.0 Relief Trouble Shooting

1.1.0 Proper impression

1.2.0 Improper lock-up procedure

2.0.0 Offset Process Trouble Shooting

2.1.0 Camera trouble shooting

2.1.1 Exposure

2.1.1.1 Line copy
2.1.1.2 Halftone

2.2.0 "E" additive plate trouble shooting

2.2.1 Slow development
2.2.2 Uneven development
2.2.3 Plugging
2.2.4 Dot gain
2.2.5 Dot loss
2.2.6 Weak image bond
2.2.7 Image loss
2.2.8 Scratches
2.2.9 Specks & spots
2.2.10 Blinding/slow rollup
2.2.11 Low plate mileage

2.3.0 Press trouble shooting

2.3.1 Paper feeding problem

2.3.1.1 Double
2.3.1.2 Erratic
2.3.1.3 Crooked

3.5.4 Attaching screen to film

3.5.4.1 Handling
3.5.4.2 Drying

3.5.5 Pre-printing preparation

3.5.5.1 Remove backing
3.5.5.2 Block out

3.5.6 Printing

3.5.6.1 Ink selection
3.5.6.2 Paper register
3.5.6.3 Squeegee selection

3.5.7 Clean up

3.5.7.1 Solvent selection
3.5.7.2 Disposal of waste

4.0.0 Trouble Shooting Duplicator Process

4.1.0 Stencil (mimeograph) duplicator

4.1.1 Stencil preparation

4.1.1.1 Typing
4.1.1.2 Handwritten
4.1.1.3 Drawing
4.1.1.4 Electronically prepared

4.1.2 Correcting the stencil
4.1.3 Ink selection
4.1.4 Duplicator

4.1.4.1 Loading stencil
4.1.4.2 Adjusting feed
4.1.4.3 Adjusting delivery
4.1.4.4 Trial run
4.1.4.5 Final adjustment
4.1.4.6 Run
4.1.4.7 Clean-up
4.1.4.8 Preparation for storage

4.2.0 Spirit duplicator

4.2.1 Prepare master

2.3.2 Mis-register
2.3.3 Sheets torn at lead edge
2.3.4 Scumming or tenting
2.3.5 Ink emulsifying
2.3.6 Unequal ink/water ratio
2.3.7 Uneven inking of roller
2.3.8 Ghosting
2.3.9 Blurred image

3.0.0 Screen Printing Trouble Shooting

3.1.0 Fabric selections

3.1.1 Microfilament
3.1.2 Multifilament

3.2.0 Pre-preparation of the screen

3.2.1 Proper stretching

3.3.0 Preparation of the screen

3.3.1 Degreasing

3.4.0 Direct photographic screen process

3.4.1 Mixing emulsion
3.4.2 Coating
3.4.3 Exposing
3.4.4 Developing

3.4.4.1 Water temperature
3.4.4.2 Handling

3.5.0 Indirect photographic screen process

3.5.1 Handling light sensitive film
3.5.2 Exposure

3.5.2.1 Time
3.5.2.2 Procedure

3.5.3 Developing

3.5.3.1 Temperature
3.5.3.2 Chemical
3.5.3.3 Wash out

4.2.1.1 Typing
4.2.1.2 Handwritten
4.2.1.3 Drawing on the master

4.2.2 Correcting spirit masters
4.2.3 Printing

4.2.3.1 Attaching the master

4.2.3.1.1 Gripper
4.2.3.1.2 Cylinder

4.2.3.2 Feed system
4.2.3.3 Delivery system
4.2.3.4 Fluid control
4.2.3.5 Pressure control

4.3.0 Office copier

4.3.1 Density
4.3.2 Image preparation
4.3.3 Number of copies

SELECTED STUDENT COMPETENCIES AND SAMPLE LEARNING ACTIVITIES FOR

Graphic Arts

UNIT IX: Reprographic Process Trouble Shooting

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Trouble shoot process camera related to exposure for both line and halftone photography.	A.1 Use an exposure computer to determine the proper halftone exposure technique. A.2 Calibrate the camera for both line and halftone photograph.
B. Solve problems related to offset plate production.	B.1 Expose and develop plate, observe and correct as necessary, such as; longer exposure, deletion of areas, scratches, etc. B.2 Vary exposure time and notice the results on the plate after development.
C. Solve basic offset malfunction and the corrective adjustments to be made.	C.1 Students will make preliminary offset press adjustments and make the adjustments necessary for a smooth production run.
D. Describe the basic problems related to screen printing as related to direct and indirect photographic methods.	D.1 Coat screen, dry, expose and develop, examine screen for defects. D.2 Expose indirect screen emulsion, develop, wash out, check for defects, and attach to screen.
E. Contrast methods of correcting spirit masters and mimeograph stencils.	E.1 Prepare a spirit master and mimeograph stencils and make corrections.

UNIT X

Graphic Arts Plant Operation

OBJECTIVES:

This unit is meant to provide a student with:

1. An understanding of a graphic arts plant operation
2. An appreciation for the various types of graphic arts services

1.0.0 Divisions of Work

- 1.1.0 Management & service workers
  - 1.1.1 Executives
  - 1.1.2 Sales staff
  - 1.1.3 Estimators
  - 1.1.4 Office staff
  - 1.1.5 Maintenance workers
  - 1.1.6 Copywriters & advertising
  - 1.1.7 Layout designers
  - 1.1.8 Photographers, retouchers, artists and drafters
- 1.2.0 Composing room
  - 1.2.1 Compositors
  - 1.2.2 Proofreaders
  - 1.2.3 Platemakers
- 1.3.0 Lithographic preparation
  - 1.3.1 Camera operators
  - 1.3.2 Strippers
  - 1.3.3 Platemakers
- 1.4.0 Printing & binding
  - 1.4.1 Storekeepers
  - 1.4.2 Papercutters
  - 1.4.3 Press operators
    - 1.4.3.1 Feeders & helpers
- 1.5.0 Shipping & receiving
  - 1.5.1 Shipping/receiving personnel

UNIT X

1.6.0 Special services to the trade

1.6.1 Supply houses

1.6.1.1 Lithographic
1.6.1.2 Chemical
1.6.1.3 Graphic arts supply houses

1.6.2 Composition houses
1.6.3 Special artwork
1.6.4 Platemakers

2.0.0 Organization of the Graphic Arts Industry in Relation to Types of Service

2.1.0 Commercial printing firms

2.1.1 Quick printing firms

2.1.2 Specialized printing

2.1.3 Trade shop printing

2.1.4 In-plant printing

2.1.5 Book & magazine printing

2.1.6 Newspaper

3.0.0 Methods of Production

3.1.0 Offset

3.2.0 Web

3.3.0 Gravure

3.4.0 Relief

3.5.0 Screen

4.0.0 The Scope of Graphic Arts

4.1.0 Size

4.2.0 Employment

4.3.0 Growth

4.4.0 Value of printed materials

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT X: Graphic Arts Plant Operation

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Describe the operation and organization of the modern graphic arts industry.	A.1 Visit a commercial graphic arts printing firm. A.2 Prepare a report of your visitation. A.3 Discuss the functions of the various printing firms in regards to the service performed.
B. Identify the methods of reproduction used throughout the graphic arts industry.	B.1 Visit a graphic arts printing firm and prepare a report covering the method of reproduction used by that particular firm. B.2 Collect magazine samples of various reproduction methods being used in the current graphic arts industry.
C. Differentiate between the various services performed within the graphic arts industry.	C.1 Classify a series of printing firms in regards to the service performed by each firm, such as trade, inplant, etc.
D. Describe the scope of the graphic arts industry in relation to its size, growth, value of goods, and number of people employed.	D.1 Discuss the scope of the graphic arts industry through films, visitations, reading, etc.

UNIT XI

Career Opportunities

OBJECTIVES:

This unit is meant to provide a student with:

1. An understanding of various career opportunities related to the graphic arts industry

2. The basic resources to obtain additional career information

1.0.0 Choosing a Career

- 1.1.0 Creative professionals
  - 1.1.1 Artist/designer
  - 1.1.2 Photographer
  - 1.1.3 Reporter
  - 1.1.4 Editor
- 1.2.0 Craftspeople
  - 1.3.1 Scientists
  - 1.3.2 Engineers
- 1.4.0 Technicians
  - 1.4.1 Quality control
  - 1.4.2 Estimator
  - 1.4.3 Computer specialist
- 1.5.0 Marketing people
- 1.6.0 Office & clerical workers
- 1.7.0 Manager & Owners
  - 1.7.1 Personnel managers
  - 1.7.2 Production managers
  - 1.7.3 Owners
- 1.8.0 Teachers

2.0.0 How to Prepare for a Career in Graphic Arts

- 2.1.0 Parents
- 2.2.0 Peers
- 2.3.0 Professionals

SELECTED STUDENT COMPETENCIES
AND SAMPLE LEARNING ACTIVITIES
FOR

Graphic Arts

UNIT XI: Career Opportunities

SELECTED STUDENT COMPETENCIES	SAMPLE LEARNING ACTIVITIES
THE LEARNING ACTIVITIES SHOULD ENABLE THE STUDENT TO:	
A. Compare and contrast the various employment opportunity within the graphic arts industry.	A.1 Students may use want-ads, magazine ads, etc. to determine the job demand. A.2 Interview a person currently employed in graphic arts. A.3 Compare pay scale in graphic arts related positions.
B. Identify sources of employment possibility in the community.	B.1 Prepare a list of all industries in the community related to the graphic arts industry. B.2 Visit local industry and determine the job skill requirements.
C. Explain job entrance requirements, qualifications and training in the graphic arts industry.	C.1 Guest speakers, visitations, films. pamphlets, etc. C.2 Assemble resources of institutions providing training in graphic arts. C.3 Contact the employment bureau office for a list of graphic arts related opportunities.

REFERENCES

Adams, J. Michael, & Faux, and David D., Printing Technology. A Medicine of Visual Communications. North Scitnate, Massachusetts: Duxbury Press, 1977.

Blair, Raymond, and Charles Shapiro (Eds)., The Lithographers Manual. (6th ed.). Pittsburgh, Pennsylvania: Graphic Arts Technical Foundation, 1980.

Cogoli, John E., Photo-Offset Fundamentals. (4th ed.). Bloomington, Illinois: McKnight Publishing Company, 1980.

Dennis, Ervin A., Lithographic Technology. Indianapolis, Indiana: Bobbs-Merrill Company, 1980.

Dennis, Ervin A., and John D. Jenkins. Comprehensive Graphic Indianapolis, Indiana: Howard W. Sams & Company, 1974.

Lathrop & Kunst, Photo-Offset, Chicago, Illinois: American Technical Society, 1979.

Prust, Z.A., Photo-Offset Lithography. South Holland, Illinois: Goodheart-Willcox Company, 1977.

Siverdlaw, Robert M., Introduction to Graphic Arts. Chicago, Illinois: American Technical Society, 1979.

Spence, William P., & Vequist, and David G. Graphic Reproduction. Peoria, Illinois: Charles A. Bennett Company, 1980.

Films:

"We Used to Call It Printing
Dupont De Nemours and Company
Incorporated, E.I.
Motion Picture Section
Advertising Department
1007 Market Street
Wilington, Delaware 19898